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Inspired by the publication of a book celebrating the role of the women in the Manhattan Project, this paper seeks to demonstrate that such an effort – to the extent it accepts and endorses the historical, political and scientific legitimacy of the Project – is both misguided and dangerous. An alternative feminist critique is presented: one respecting the views of those scientists (men and women) who refused to participate or who have sought to challenge the reductionist Western scientific paradigm from which the Bomb emerged. Illumination of the repressive and hierarchal structures requisite for the “birth” of the nuclear age is undertaken and views excised by the official narrative – the voices of wives, daughters and victims – are recalled. In constructing this “counter-narrative”, critical stress is laid on the multiple negative legacies of the Project and the positive requirement for humane, sustainable alternatives to the poisonous technologies often spawned by current forms of scientific inquiry.

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**OUR DAY IN THEIR SHADOW:
CRITICAL REMEMBRANCE, FEMINIST SCIENCE AND THE
WOMEN OF THE MANHATTAN PROJECT**

Lee-Anne Broadhead

Abstract

Inspired by the publication of a book celebrating the role of the women in the Manhattan Project, this paper seeks to demonstrate that such an effort – to the extent it accepts and endorses the historical, political and scientific legitimacy of the Project – is both misguided and dangerous. An alternative feminist critique is presented: one respecting the views of those scientists (men and women) who refused to participate or who have sought to challenge the reductionist Western scientific paradigm from which the Bomb emerged. Illumination of the repressive and hierarchal structures requisite for the “birth” of the nuclear age is undertaken and views excised by the official narrative – the voices of wives, daughters and victims – are recalled. In constructing this “counter-narrative”, critical stress is laid on the multiple negative legacies of the Project and the positive requirement for humane, sustainable alternatives to the poisonous technologies often spawned by current forms of scientific inquiry.

Celebrating Weapons of Mass Destruction: A New Goal for Feminism?

It is not surprising that feminists do not share a monolithic view of nuclear weapons and their social, political, economic and environmental impact. Many feminists focus their research, and activist energies, on more immediate social justice issues – and some are more radical in their demands for institutional change. I have always celebrated the diversity of feminist opinion and opposed the contention that a common minimal definition of “feminist” could or should be articulated.

Nonetheless, in the months preceding the sixtieth anniversary of the Hiroshima and Nagasaki atrocities, I found myself deeply troubled by, and constantly returning to, debates surrounding feminist science. I have long been drawn to those writers, feminist or otherwise, who argue that we must confront the very way we “do” science – i.e. critique its basic methods, techniques and objectives – in order to effectively challenge the often-disastrous consequences of its practice. Many feminist scholars, however, have been intent instead on celebrating the role of women (past and present)

in the profession, and to advance in this way the “cause” of equal participation by men and women in the scientific arena. While this access-oriented approach illuminates gender discrimination, it leaves unchallenged the pernicious (and socially destructive) gender constructions encoded in the mainstream scientific outlook. It was not until I read a volume by two nuclear physicists celebrating the role of women in the Manhattan Project that I began to reflect more systematically on the limitations, and potential dangers, of this way of thinking.

This book – *Their Day in the Sun* by physicists Ruth Howes and Caroline Herzenberg (1999) – makes explicit and amplifies the celebratory tone of other works highlighting the role of women (scientists and others) in the Manhattan Project (such as Fermi, 1954; Jette, 1977; Libby, 1979; Manley, 1990; Wilson and Serber, 1997). As is the case with these works, the study is unambivalently and unquestioningly supportive of the merits and supposed necessity of the enterprise, and studiously uncritical with regard to its broader, long-term impact. It also clutches at the fact that many of the quarter of a million people drawn into the secret production of the world’s most inhumane and indiscriminate weapon were women. In casting light on these women, Howes and Herzenberg (1999) hope to inspire greater numbers of young women to enter their chosen field of study. It is my contention that their effort leaves a great many others – both women and men whose actions are perhaps of greater inspirational value – in the shadows. More disturbingly, because of their tacit support for the project, their approach remains rooted in the shadow of the Bomb.

Howes and Herzenberg (1999, p. 1) urge their readers to “go on to examine additional aspects of this intriguing topic”. The following paper is a heartfelt acceptance of this challenge, setting the issue – women’s role in the making of the atomic bomb – in the broader context of debates over both the Manhattan Project as well as western science more generally. To widen the frame, I propose bringing a few people, representative of different groups, in from the shadows cast by the study’s selective searchlight. Such an investigation will, I trust, provide us with the opportunity to critically remember the origin and outcome of the Manhattan Project, allow us to reflect on the strengths and weaknesses of feminist science, and, perhaps of greatest import, encourage us to resist the silencing of alternative views that occurs in a “writing out” of history which serves to stabilize a pro-nuclear weapon narrative.

Silencing Others to Celebrate the Science of Mass Destruction

For Howes and Herzenberg (1999) to make their basic arguments – that women contributed significantly to the Manhattan Project, and that this

success should generate a new-found enthusiasm in young women for science – they must establish the conditions allowing for a presentation of the enterprise as an unambiguous success. To do this, the many concerns that have been raised about the project (both at the time and with hindsight) must be silenced, either by dismissal or omission.

The list of “silenced others” should, given Howes and Herzenberg’s goal of casting light on participants they deem to have been ignored, begin with scientists whose voices might indeed inspire young women to think seriously about a career in science – but from a very different, anti-nuclear and anti-war, perspective. I have chosen to divide these scientists into two groups. First, the “refusniks” who spurned any involvement in the project itself and, secondly, the “transformists” who seek to affirm, as part of a broader political and social movement, a radical new vision of the basic constituents, methods and goals of western science. Between these categories, I will also give voice to the wives, daughters, scholars and survivors of the Manhattan Project whose dissenting views have also been silenced in order to depict the project as a model of successful scientific investigation or achievement.

The dense shadow of exclusion cast by *Their Day in the Sun* serves its purpose well, banishing or obscuring many awkward and critical themes; prominent among them, ironically, is the shroud of darkness in which the project itself was wrapped, i.e. the veil of ignorance in which the vast majority of project workers lived and laboured. As President Truman (1945) enthused, drawing the curtain on a smouldering Hiroshima:

We now have two great plants and many lesser works devoted to the production of atomic power. Employment during peak production numbered 125,000 and over 65,000 individuals are even now engaged in operating the plants. Many have worked there for two and a half years. Few know what they have been producing. They see great quantities of material going in and they see nothing coming out of those plants, for the physical size of the explosive charge is exceedingly small. We have spent two billion dollars on the greatest scientific gamble in history – and won.

Was it too much of a gamble for Herzenberg and Howes to honestly explore the implications of this basic facet of the project? Or did they calculate that doing so might cloud the celebratory clarity of their study, perhaps raising in the process questions about the transparency, independence and integrity of military-industrial “big science” in the post-1945 era? Should the women who unknowingly participated in the creation of the most lethal means of destruction in history be celebrated or pitied? Should they feel pride at the job completed or anger that their own government put them in such a position?

The sunny mood of the book would also, of course, be more than dampened by reference to the mounting evidence that the use of nuclear weapons in 1945 was unnecessary and illegal. Howes and Herzenberg are not

obliged to be persuaded by this evidence; but with a major scholarly debate in full spate, should they not at least present the case against the bombings alongside the one-dimensional official narrative which has occupied centre stage for so long? In terms of the project itself, we may be entitled to question the absence of the uncertain, contradictory, sometimes haunted voices of the women – wives, mothers and daughters – seemingly expected to remain in the background, loyally supporting their men. And where, finally, are the voices of the victims of Hiroshima and Nagasaki recounting their own dark day in the atomic sun? If Howes and Herzenberg are, as they appear, genuinely proud of the role of women in the delivery of such death and destruction, one might ask that they be prepared to confront the actual human (and environmental) consequences of “success”.

Resisting Temptation: The Scientists Who Said “No”

The celebration of Manhattan Project women – both the handful who knew what they were doing, and the multitude kept in the dark – stems from a determination to redress the neglect of women’s contribution to key scientific and technological enterprises. Many feminists believe that through the provision of worthy role-models we can best encourage young women to enter scientific professions. Howes and Herzenberg (1999) clearly locate their effort in this tradition but, for two main reasons, stand on shaky ground.

First, their claim that “the earliest books that came out about the Manhattan Project, including official histories, made no mention of contributions by female scientists and engineers” (Howes and Herzenberg, 1999, p. 1) is erroneous. It would be virtually impossible for any history of the development of the Bomb *not* to mention the “Founding Mothers”, as Howes and Herzenberg call them, of atomic physics. A cursory glance at some of the “earliest books” makes the case: three of the most popular and influential volumes published in the aftermath of World War II all praise the crucial pioneering role, experimental and theoretical, played by three women – Marie Curie, her daughter Irène Joliot-Curie, and Lise Meitner (Dietz, 1945; Laurence, 1946; Geddes *et al.*, 1945)

Second, while it is true that most books on the Manhattan Project do not cover the role of women extensively, neither do they document the contribution of the vast majority of men. To write an all-encompassing history of the venture, crediting the part played by every worker-in-the-dark, or even scientist-in-the-know, would be an impossible task. Howes and Herzenberg (1999, p. 199) correctly state that women scientists and technicians were “active in nearly every aspect of the project’s technical work”. As Margaret Rossiter (1995, p. 5) observes, however, there were around a dozen (“at least

eleven”) women working in the project’s inner circle by 1945, with only one (Leona Marshall Libby) active from the outset. In addition to exaggerating the deficit purportedly corrected by their study, Howes and Herzenberg misrepresent, or simply silence, the stand taken by a number of women scientists (including some whose science they exalt). Given their statement that researching the book was akin to detective work, they either missed some vital clues or repressed some crucial evidence.

Early in their book, Howes and Herzenberg (1999, p. 20) ponder: “why did women’s prominence in nuclear physics not carry over directly to the Manhattan Project? Why did the women who led the development of nuclear science in Europe not join their male counterparts as leaders of the effort to develop the atomic bomb?” Marie Curie died in 1934, but both Lise Meitner and Irène Joliot-Curie were at the height of their powers, and in the foremost ranks of their profession, at the outbreak of war. How do the authors account for their non-recruitment?

Meitner was sometimes handed the moniker of “mother of the bomb” for her enormous contribution to the detection and interpretation of nuclear fission (Sime, 1996, p. 315). Given her point-blank refusal to conduct war-work in the United States, or anywhere else, the label is grotesquely inappropriate. Mentioning her decision to remain in Stockholm, in precarious and lonely exile, Howes and Herzenberg (1999, p. 32) quote Meitner’s adamant statement: “I will have nothing to do with a bomb”. They then allow her presence, and anti-militaristic stance, to fade without trace from the ensuing celebration of military science.

Irène Joliot-Curie’s non-participation receives no attention, even though her case is well-documented and extremely instructive. When the Nazis invaded France, Irène and Frederic Joliot-Curie, her husband and scientific partner, decided to remain in Paris despite their well-known socialism, to both support the Resistance and obstruct any military research by the Germans at their renowned atomic laboratory. If Irène had decided to flee and join the Allied programme, her left-wing associations would almost certainly have cost her a security clearance, or at least consigned her into a backwater region of the Project, as happened to the Joliot-Curies’ two assistants, Hans von Halban and Lew Kowarski, following their escape from France (Weart, 1979). Her likely reception during the war, in fact, can be gauged from a subsequent episode: in 1948, Irène Curie arrived in the United States only to be detained by immigration officials because of her involvement in left-wing organizations (Weart, 1979)

My charge, in short, is that in the cases under review, Howes and Herzenberg refuse to engage or acknowledge significant dissenting voices ideally suited to illuminating the complexity of the issue. Indeed, their statement, early in the book, that women were attracted to work on the

Manhattan Project because the “rise of Nazi Germany and the growing documentation of genocide in Europe convinced most Americans that winning the war should outweigh any reluctance to work on weapons” minimizes the fact both that this was not an average weapons project, and that a leading nuclear physicist – in exile from fascism – knew precisely what the project was about and refused on moral grounds to associate herself with it. Instead, we read simply that “the women who had pioneered nuclear research were not available to the Manhattan Project” (Howes and Herzenberg, 1999, pp. 17, 34).

It is, of course, improbable that only high-profile cases exist of women scientists refusing to lend their hand to the making of the Bomb. Principled non-participation must have extended to lesser-known women able to appreciate the full horror of the new weapon. While unearthing their stories would indeed have required some dedicated scholarship, would the reward not have been a fuller, fairer and deeper study? And if such an admittedly broader investigation was, in the view of the authors, neither feasible nor necessary, then the dual-nature of their mandate should have been spelt out more clearly, not just to clarify the role of the women in question but also to defend the value of the enterprise itself.

A brief reference in Robert Jungk’s (1958) pathbreaking study of the making of the Bomb, *Brighter than a Thousand Suns*, provides a tantalizing glimpse into the anti-nuclear perspectives so sadly lacking from *Their Day in the Sun*. In a discussion on the ethics of modern scientific research, Jungk quotes an English crystallographer, Kathleen Lonsdale, arguing that “the risk that one’s work, though good in itself, may be misused must always be taken. But responsibility cannot be shirked if the known purpose is criminal or evil, however ordinary the work may be”. Jungk (1958, p. 261) continues: Only a few scientific investigators in the Western world have in fact acted on this principle. Their honesty obliged them to risk their professional future and face economic sacrifices with resolution. In some cases they actually renounced the career they had planned, as did one of Max Born’s young English assistants, Helen Smith. As soon as she heard of the atom bomb and its application, she decided to give up physics for jurisprudence.

Alas, Jungk (1958) gives no more details of Smith’s lonely act of conscientious objection; but he is surely right to attach significance, and accord respect, to her decision not to follow a career forever contaminated by the founding “mothers and fathers” of the Bomb. How many other Helen Smiths have there been? And how many more will there be if a deeper feminist critique of the history – and future – of western science continues to be marginalized?

It may seem unfair, as part of an effort to examine the role of women in this enterprise, to note that a number of male scientists shared Meitner’s explicit refusal to work on the new weapon. In seeking to balance the laudatory

tone of the study it is important to acknowledge that some men either struggled with their decision to participate in the project or declined involvement on moral grounds. Lawrence Badash (2005) recounts the case of Volney Wilson who initially declined but eventually joined after deciding it was his patriotic duty. Badash (2005) also reports that leading British physicist James Chadwick told him “a few” British scientists refused for humanitarian reasons. Similarly, Joseph Rotblat (1985) reports that Ludwick Wertenstein (a pupil of Marie Curie and a pioneer in the field of radioactivity) said he would never engage in the science of nuclear weapons. There are doubtless others whose stories of resistance have been largely silenced by the mainstream post-Hiroshima storytelling.

The case of Rotblat, who later became a leading advocate of nuclear disarmament, is also germane: initially convinced of the need to “deter” Hitler (a rationale he subsequently rejected), Rotblat left Los Alamos when it became clear the German push for the Bomb had failed (Rotblat, 1985). Rotblat’s post-Hiroshima decision to work only on science beneficial to humanity (medical radiology), while campaigning tirelessly for complete nuclear disarmament, provides a role model for young scientists (of either sex) far more valuable than the weapons scientists held high by Howes and Herzenberg.

Shadows and Blindfolds: Women Working in the Dark

Those few scientists who knew the details of the project possessed a luxury denied the vast majority of participants: human moral agency. Irrespective of whether one supports their decisions, they were at least taken in cognizance of main facts and issues. What is more difficult – and dubious – is to celebrate the role of individuals blind to the “big picture”; male and female cogs in the machine who became unwitting accomplices in an act of immeasurable moral and political consequence.

While acknowledging that almost all the women knew not what they did, Howes and Herzenberg (1999, p. 138). insist they simply “accepted the word of their supervisors that doing their job well would help to win the war”. While most certainly realized they were engaged in weapons work they were nonetheless ignorant of either its qualitatively unprecedented destructiveness or its revolutionary capacity to shape the post-war world. As Dwight MacDonald (1957, p. 175) wrote in the aftermath of the attacks:

It hardly needs to be stressed that there is something askew with a society in which vast numbers of citizens can be organized to create a horror like The Bomb without even knowing they are doing it. What real content, in such a case, can be assigned to notions like “democracy” and “government of, by and for the people”?

In 1939, Niels Bohr argued that the development of an atomic bomb was unlikely “unless you turn the United States into one huge factory”. He later maintained he had been correct, given the scale of the industrial effort involved (Rhodes, 1986, p. 294). But who would have believed that in a democratic country such an effort would be regarded as acceptable and worthwhile, birthing not only the atomic age but the “big science” era, umbilically linked to the military-industrial complex and increasingly remote from public and social concerns? As physicist Jerrold Zacharias (in Forman 1987, p. 152) has said: “World War II was in many ways a watershed for American science and scientists. It changed the nature of what it means to do science and radically altered the relationship between science and government ... the military ... and industry”. Young women in the process of choosing their careers are not oblivious to the fact that much of modern physics is in the service of the military. Those who support this state of affairs may indeed choose physics as their career path. Many others, however, will direct their attentions elsewhere.

The deformation of the discipline of physics by the Manhattan Project should be seen in a broader and darker context: the terrible toll exerted on American democracy. As Dieter Georgi (1985, p. 493) dramatically argued: “The most demonic success of Hitler was his ability to Hitlerize his enemies, sealed by two atomic bombs”. Others, of course, claimed the success of the project as proof of the superiority of democratic over totalitarian systems. For John Sember (1945, p. 500), “There was no better wartime example of the democracies beating the totalitarians at their own game than the perfection of the atomic bomb”:

In a sense we have eaten our cake, and have it too! We chose to develop the atomic bomb by means which we consider legitimate within the framework of our institutions. The totalitarians, fired by a desire no greater than ours to lay hands on the weapon of our time, would have used any device regardless of the effect on individuals or institutions. Once more we decided that the end, however urgent or vital, does not justify the means of tyranny. Thus we may already have laid one chain of restraint about the atomic Frankenstein. We did not even let the prized promise of the atomic bomb make us totalitarian.

This myth is only sustained, however, by evading the designedly undemocratic organization of the project. Not only was the vast majority of the workforce (and management) in the dark, so was vice-president Truman and almost all of the Congress. As Barton J. Bernstein (1995, p. 138) notes:

The Manhattan Project, costing nearly \$2 billion, had been kept secret from most cabinet members and nearly all of Congress. Secretary of War Henry L. Stimson, a trusted Republican, and General George C. Marshall, the equally respected army chief of staff, disclosed the project to only a few congressional leaders. They smuggled the necessary appropriations into the War Department

budget without the knowledge – much less the scrutiny – of most congressmen, including most members of the key appropriations committees.

Many Americans embraced the project not primarily as a vindication of the “democratic” system, which it palpably was not, but simply as the necessary means to a vital end: swiftly ending a brutal conflict. This belief, however, is supportable only on the basis of a partial, prejudiced and semi-silenced historical record.

Re-Running the Black and White Movie: Silencing the Historical Record

While it may be psychologically necessary for those who (often unwittingly) played a role in the creation of nuclear weapons to accept the distortions and myth-making central to the government’s justification, one expects a higher standard from researchers dealing with the many complexities and disputes over the development and use of the Bomb. Howes and Herzenberg are not required to produce a general political history of the Manhattan Project. In order to valorize the role of the women involved, however, they *are* required to repeat and support the official narrative about the ending of the war.

At this remove – and after six decades of official Hiroshima mythmaking – it is difficult to appreciate that initial American public support for the bombings was *not* a given. It was, in fact, with some difficulty that the Truman administration sought to establish a heroic, irreproachable narrative sufficient to defuse the shock, disgust and concern of religious leaders, scientists (including some who had participated in the project), and public personalities from all walks of life.

University of Chicago Chancellor Robert M. Hutchins, for example, argued in the wake of Hiroshima and Nagasaki that, “All the evidence points to the fact that the use of this bomb was unnecessary” and that America had thereby “lost its moral prestige” (in Lifton and Mitchell, 1995, p. 25). The *New York Herald Tribune* found “no satisfaction in the thought that an American air crew had produced what must without doubt be the greatest simultaneous slaughter in the whole history of mankind” (in Lifton and Mitchell, 1995, p. 25). John Haynes Holmes of the Community Church of New York argued that the use of the weapons was “the supreme atrocity of the ages ... a crime which we would instantly have recognized as such had Germany and not our own country been guilty of the act” (see Boyer, 1985, p. 200). And it was not just prominent figures who were outraged. In a letter to the editor of *Time*, Walter G. Taylor wrote on August 27, 1945, that with the atomic bombings the United States had “become the new master of brutality, infamy, atrocity. Bataan, Buchenwald, Cacao, Coventry, Lidice were tea

parties compared with the horror which we ... have dumped on the world ... No peacetime applications of this Frankenstein monster can ever erase the crime we have committed" (in Boyer, 1985, p. 197).

Of course there were many people who, despising an indisputably brutal enemy and believing themselves suddenly "saved" by the Bomb, felt no such anguish. The point I wish to make is that serious public divisions forced the administration into a defense of its decision based on deliberate distortions, exaggerations and suppression of evidence. And in this, alas, they largely succeeded.

Let us begin with the most important element of the official version: that the use of the weapons was based on no other diplomatic, military or political considerations than obtaining a timely unconditional surrender from the Japanese. There are two aspects to this question, neither of which are treated even superficially in *Their Day in the Sun*: did the bombings deal an unavoidable, necessary blow to the Japanese system, sufficient to induce a speedy capitulation; and was there another, secret motivation behind the attacks?

The first claim rests on two presumptions: (a) the reception and rejection by Japan of a fair, clear warning of an imminent attack of unprecedented magnitude, and (b) a profound Japanese disinterest, pre-Hiroshima, in offering a final surrender. This case can only be made by ignoring, for example, the fact that Ralph Bard, Under-Secretary of State of the Navy, resigned precisely because he did not believe that Japan had been warned appropriately and, as important, that the empire had already been defeated.

With regard to the broader issue of motivation, many of the key players have left a record sufficient to cast doubt on their own case. Despite his paranoiac devotion to secrecy, General Leslie Groves, the project's military director, had loose enough lips over Los Alamos dinner tables to discuss with scientists the importance of using the bomb before the end of the war in an effort to "subdue the Soviets" (Rotblat, 1985, p. 18). James Byrnes, Truman's Secretary of State, told Leo Szilard that "possessing and demonstrating the bomb would make Russia more manageable in Europe" (Lifton and Mitchell, 1995, p. 137). One of the leading British physicists on the Project, P. M. S. Blackett, wrote in 1949 that the decision to use the bomb had been "not so much the last military act of the second World War, as the first act of the cold diplomatic war with Russia" (Blackett, quoted in Lifton and Mitchell, 1995, p. 271). And another Los Alamos scientist, the American Philip Morrison (1949, p. 40), suggested that the "mysterious final date which we, who had the daily technical job of readying the bomb, had to meet at whatever cost in risk or money or good development ... is hard to explain except by Blackett's thesis".

The question of whether the Bomb should have been dropped is inextricably linked in the official narrative with how many lives, particularly American lives, its use saved through obviation of a land invasion of Japan. This is a claim that Howes and Herzenberg (1999, p. 183) appear to uncritically accept when they posit that, “For many Manhattan Project women, a sense of responsibility for the weapon they had helped to create accompanied the pride they took in the work, but most, like most Americans in general, seem to have felt that the creation of the atomic bomb had been necessary”. They quote Leona Marshall Libby’s son as saying that Libby had herself believed that the use of the weapon had “saved a lot of lives, with the invasion casualties estimated [at] at least a half-million people” (p. 183). As Lifton and Mitchell (1995) note, Truman did not make this claim in his first statement justifying the attack on Hiroshima. It was only after the intense domestic wave of horror and outrage – occurring despite the systematic “lock-down” of damaging information about the bombings – that the “saving lives” mantra took centre stage.

Over the years, the number of lives purportedly saved has become the gift that keeps on giving. In a hugely influential February 1947 article in *Harper’s Magazine* – widely-regarded as the definitive statement of the administration’s agreed position – Secretary of War Stimson placed the number of American casualties at 1 million. Right-wing journalist Wm. F. Buckley later set it as high as 2 million and *USA Today* columnist Tony Snow placed it at an incredible 6 million during the 50th anniversary debate in 1995, describing the figure, matching the death toll from the Nazi Holocaust, as “the consensus view” (Lifton and Mitchell, 1995, pp. 285-288). But based on the archival record the scholarly consensus, as Walker (1995, p. 321) points out, is that the number of American lives saved “even in the worse case, would have been in the range of tens of thousands rather than hundreds of thousands”.

Stimson’s *Harpers* article contended that while the Bomb was “a new and tremendously powerful explosive”, it was nonetheless “as legitimate as any other of the deadly explosive weapons of modern war” (Stimson, 1947, p. 98). Both private comments and public statements by Truman, however, belie this claim. At a meeting with advisors in July 1948, the President described the weapon as “destructive beyond anything we have ever had. You have to understand that this isn’t a military weapon. It is used to wipe out women and children and unarmed people, and not for military uses. So we have got to treat this differently from rifles and cannons and ordinary things like that” (in Lifton and Mitchell, 1995, p. 182). In a diary kept during the Potsdam Conference, Truman wondered if the Bomb “may be the fire destruction prophesied in the Euphrates Valley Era, after Noah and his fabulous ark”, expressing his fear that “machines are ahead of morals by some centuries and when morals catch up

perhaps there'll [be] no reason for any of it. I hope not, but we are only termites on a planet and maybe when we bore too deeply into the planet there'll [be] a reckoning – who knows?" (in Bernstein, 1980, pp. 33-34). And in a bout of public honesty – and one, surprisingly, little reported on – Truman referred to the attacks as "the wholesale slaughter of human beings", many of them "women, children, and [other] noncombatants" (in Bernstein, 1998, p. 559).

In many ways all the claims of the official narrative are irrelevant given the impermissibility under international law of deliberately targeting civilians in wartime. In taking the decision to develop the atomic bomb – by its very nature an indiscriminate weapon – the United States government undermined its commitment to the prohibition against the targeting of civilian populations evidenced by its ratification of the Convention with Respect to the Laws and Customs of War on Land (1902, 1907) and its support for the Rules of Aerial Warfare (1923). Many of those who justify this *volte face* do so on the non-legal grounds that the conflict had become a "total war", despite Roosevelt's 1939 appeal not to attack civilian populations. Such apologists point to the lower death toll in Hiroshima than, say, the massive fire raids on Tokyo a few months earlier. But the fact that the attacks that laid the platform for Hiroshima and Nagasaki were indisputably illegal does not mean that the atomic bombings were not; and, for all their horror and destructiveness, the fire raids were different and lesser in both degree (casualties inflicted from a single munition) and kind (radiation sickness) from the uranium and plutonium weapons.

Paul Tibbets, the pilot of the *Enola Gay* – the plane, named after his mother, which dropped the "Little Boy" bomb on Hiroshima – has reminisced about his own role in the event. Recounting his discussion with General Ent in advance of the mission, Tibbets perhaps reveals more than he should about American military views on the weapon's dubious legality. Tibbets reports Ent saying, "Paul, be careful how you treat this responsibility, because if you're successful you'll probably be called a hero. And if you're unsuccessful, you might wind up in prison" (in Terkel, 2002). Ent clearly shared the perspective of Manhattan Project physicist Leo Szilard, who argued:

Let me say only this much to the moral issue involved: Suppose Germany had developed two bombs before we had any bombs. And suppose Germany had dropped one bomb, say, on Rochester and the other on Buffalo, and then having run out of bombs she would have lost the war. Can anyone doubt that we would then have defined the dropping of atomic bombs on cities as a war crime, and that we would have sentenced the Germans who were guilty of this crime to death at Nuremberg and hanged them? (Szilard, 1960)

Tibbets, however, never let his conscience become cluttered by the tenets of the Geneva Conventions: "You're gonna kill innocent people at the same time, but we've never fought a damn war anywhere in the world where they didn't kill innocent people. If the newspapers would just cut out the shit:

‘You’ve killed so many civilians.’ That’s their tough luck for being there” (in Terkel, 2002).

Such callous disregard for human life is disturbing when it comes from the participants in such actions; but the tacit acceptance that the use of these weapons was valid and legal on the part of feminists seeking to encourage more women to enter science is nothing short of shocking.

Other Voices Worth Hearing: Wives and Daughters

The Manhattan Project wives have long been visible through their own writings and now, increasingly, are being viewed through the lenses of researchers. In *Their Day in the Sun*, the wives are deployed to lighten the atmosphere and express support for their husbands, the project, and the Bomb. Laura Fermi’s (1954) reminiscences are drawn on to contribute humorous anecdotes and to recall the seriousness with which their husbands received the news of the attack on Hiroshima. An extraordinary quote from Fritz Matthias’ wife is used to justify the bombings: “I couldn’t help but believe that God, wearying of this long and tortuous war, had finally, reluctantly, given us this terrible weapon with which to end it”. Lilli Hornig is given voice to suggest that there really was not much discussion of the ethics of using the bomb – despite the fact she also remembered signing a petition supporting a demonstration blast (Howes and Herzenberg, 1999, pp. 184-185).

It is impossible to tell how selective Howes and Herzenberg have been in their recounting without access to the interview transcripts. What we do know is that in other works – even by women sharing the goal of highlighting women’s contributions to the project – greater scope is given to mixed feelings and moral doubt. Kathleen Manley, for instance – whose mother worked on the project at Los Alamos – records the widespread disquiet felt by many of the wives alongside a generally uncritical presentation of events and rationales. In a typical example, she quotes Jane Wilson as saying: “We had no shame for the bomb then, which a lot of us had afterwards” (Manley, 1990). Howes and Herzenberg cite Wilson’s earlier book – but fail to mention this change of heart.

A Wife and Mother: Phyllis Fisher

The case of Phyllis Fisher – author of *Los Alamos Experience* (1985) and wife of Leon Fisher, a member of Luis Alvarez’s plutonium-detonator team – shows even more clearly the selectiveness of Howes and Herzenberg’s treatment of the wives’ perspectives. While her memoir is replete with

feelings of guilt and dismay at the outcome of the project, she is summoned in *Their Day in the Sun* only to recount her realization “that that the colored cylinders her husband had brought home as children’s toys were the casings from parts for the bomb. She had strung them together to make Christmas ornaments” (Howes and Herzenberg, 1999, p. 185). For Howes and Herzenberg, this anecdote is a quaint and humorous vignette. For Fisher (1985, p. 128), it set in stark relief the inhumanity of the Project against the importance of natural life:

Detonators? Suddenly I remembered the box of hollow cylinders made of brightly colored plastic. They were not needed at the lab, so Leon had brought them home for Bobby to play with. They were red and green, as I recall. Bobby hadn’t shown much interest in them. So I appropriated the small cylinders and, stringing them together, laced them through evergreen branches and made a colorful ornament out of them.

Now really curious, I asked, “where those—?”

“Yes, they were!” he replied before I finished my sentence.

What ironic mixed symbolism! The evergreen branches, a reminder of life’s renewal had been trimmed with detonator casings, messengers of death! Ignorance had sanctioned that strange combination. No wonder Leon winced when he saw the detonator decoration. No longer did I think that Leon was really unreasonable when he insisted that I take my creation apart.

One of the strengths of Fisher’s work is its critique of the police-state bureaucratization of Los Alamos life. While other wives, for example, lament or satirize the endless inconveniences and indignities of project secrecy (barbed wire fences, mounted police controls, censorship, constant surveillance, etc.), Fisher (1985, pp. 39-40) goes further: “I began to suspect that *we* were the prisoners, the dangerous ones, and that ‘they’ were the safe ones outside. Why? Well, what sort of people are fingerprinted, photographed, and required to identify body scars upon arrival? We were! Who had mail censored? We did!” She adds: “The suspicion that *we* were considered the threat or the danger to the outside world added a Kafkaesque, dream-like quality to our existence on the hill”. And in a further literary analogy, she develops her subversive theme of Los Alamos as *nightmare*, symbol and symptom of a very modern disease:

In the fall of 1945, Los Alamos was no imaginary retreat from the realities of life in our troubled world. Rather, we represented in a microcosm, the viewpoints of many parts of our civilization. Maybe we were more like the patients in the tuberculosis sanitarium described by Thomas Mann in *The Magic Mountain*. These hospitalized patients on their “magic mountain” debated and theorized in their splendid isolation, while surrounded by beautiful scenery. As they argued, the countries below their mountain were

preparing for World War I, which suddenly exploded all around their sanctuary. Were we doing the same thing? (Fisher, 1985, pp. 147-148)

Fisher, in sum, paints a vivid picture of the scientists, their families, and their willingness to relinquish to an unnatural social environment the fundamental rights and responsibilities of moral agency. And while recounting her relief at the success of the long project, she also reflects on the “birth of this monster” and her fears for the future. Fisher surely deserves more than a fleeting, decorative appearance in any serious study of Manhattan Project women.

A Daughter: Mary Palevsky

Some children of Manhattan Project scientists have reflected on the enduring impact – personal, social and scientific – of the enterprise. Mary Palevsky’s (2000) book *Atomic Fragments: A Daughter’s Questions* explores the complicated, sometimes anguished feelings of scientists (including both her parents) who knowingly contributed to the birth of the Bomb.

Palevsky offers her own reflections alongside the reminiscences of seven high-profile participants. Her work stands as a valuable enrichment of the literature for two main reasons. First, she insists on using her own voice in an academic work, thus encouraging *us* to engage personally with the issue: to wrestle with our conscience, examine our assumptions and responsibility, etc. In insisting on her presence – essential, she believed, to reflect meaningfully on her parents’ own reflective struggle – Palevsky (2003) was “well aware that the personal, literary, and narrative voices in academic studies have traditionally been seen as unscientific, “feminine”, soft, and emotional”. With this pervasive prejudice in mind, she gently urges the reader to accept that the real impact of the Manhattan Project has been felt – by participants, citizens and victims – on many levels, and that the topic cannot accurately be considered as a coolly detached subject of inquiry.

Second, Palevsky (2000, p. x) invites the scientists themselves to reflect on the moral complexities of their actions. While motivated by a respectful desire to understand, her questions nonetheless push her interlocutors beyond the platitudes and disclaimers usually offered, thus allowing fresh insight into the “ways in which individual scientists made choices about the bomb and made sense of their work”.

Palevsky is not the only daughter of Manhattan scientists to grapple with the legacy of the project, but her engagement is, to date, the most comprehensive and satisfying. It is to be hoped that similar reflections follow – not least because the voices of *all* those affected deserve to be heard by young women reflecting on possible career paths.

The Language of the Dead: The Forgotten Legacy of the Bomb

Of central import in the long list of those silenced by the official narrative are the victims of the atomic attacks and being silenced has been a part of their “death-in-life” (Lifton, 1967) since the moment of the explosion. Kenzaburo Oe notes the pervasive “*silence* of the citizens following the bombing. The great mysterious monster conquered the city in an instant. Was it unnatural that the basic reaction of the people, injured and demoralized, was stunned silence?” (Oe, 1981, p. 175). “No words”, Mitsuko Hatano (1978, p. 176) has written, “can describe the horrors and suffering we witnessed on that day and on succeeding days”. The irretrievable silence of the vanished, however, *can* be partially reclaimed by the voices of the survivors, the hibakusha. In the words of Rinjiō Sodei (1995, p. 1121), “we should listen to the voice of the survivors. Their concern is not about the past, but rather about the past as prologue to the future”.

The guardians and preservers of the official narrative have long ignored, and at times suppressed, these voices. From the censorship of horrifying accounts and images of the attacks through to those scholars who deny the cancerous reality while elevating the functionaries who produced it, the silencing of victims goes on.

How, after all, to celebrate *anyone*’s role in this?

All of them were burned or injured. Stricken with anxiety and fear, they walked on helplessly, aimlessly pushed by the great surge behind them. Some exhausted people fell by the wayside but no one thought of coming to their aid. Those with remaining strength plodded on, mute and thoughtless. The wind carried their pungent, infernal stench up the river. (Mori, 1978, p. 156)

Outside I saw people dragging what at first looked like white cloth but what I later saw was skin that had peeled from their bodies ... Before long, all my husband’s hair fell out. His face turned ashen pale. He bled from the nose, the mouth, and the anus and ran a high temperature. I tried to cool his forehead with water ... he died in an agony I could hardly bear to witness. (Izuhiro 1978, pp. 162-13)

Occasionally half-naked, blood-covered men emerged from the wall of flames. Like ghosts they scurried about in search of safety. Some of them had been exposed to powerful radiation. As they outstretched limp hands, the skin peeled off and hung from their fingernails. Blood oozed from raw flesh exposed by monstrous burns. None of them made a sound. They were too stunned to weep or cry out. (Matsumuro, 1978, p. 165)

... the dead were too numerous for the living to attend to. (Hatano, 1978, p. 177)

For comparison, a voice from another world, a woman recalling her “day in the sun”: “I was put to work in a lab with a real project of my own, and just loved what I was doing. Challenges came along daily; it was fun solving them and getting answers. I was only a bit player in the science of the Manhattan Project, but I was a player” (Weaver in Howes and Herzenberg, 1999, p. vii)

It is true and fair that those participating in the Manhattan Project should speak for themselves; but *not* without hearing the voices they destroyed, the silence they “created”.

Denying the Faustian Urge: A New Science

“It is quite abnormal”, Kenzaburo Oe (1981, p. 117) has written, “that people in one city should decide to drop an atomic bomb on people in another city. The scientists involved cannot possibly have lacked the ability to imagine the hell that would issue from the explosion”. By describing the Bomb as at once “a savagely primitive demon and a most modern curse”, Oe (1981, p. 114) invites us to explore both the contemporary construction and deep roots, cultural and psychic, of the moral blindness which culminated in the use of the Bomb.

We have all heard the inseparable refrains “science is just a method” and “the problem isn’t science but the social use of science”. Science thus delimited is simply a neutral, objective, disinterested, value-free method of inquiry. But is the case this plain?

If we examine the development and use of the atomic bomb, a far more complex and realistic picture emerges. As the work drew to a close, a number of scientists began to question the use of the weapons against Japan. Only one, Rotblat, walked away; others took a stand inside the system. Led by Szilard, scientists at Chicago’s Metallurgical Lab argued in a petition to the President that American leadership of the post-war world, dependent on the humane exercise of its “moral responsibilities”, would be irretrievably compromised by cold-blooded use of the Bomb. In 1962, Edward Teller (pp. 13-14) recounted seeking advice on the petition from Robert Oppenheimer, the project’s scientific director:

Oppenheimer told me, in a polite and convincing way, that he thought it improper for a scientist to use his prestige as a platform for political pronouncements. He conveyed to me in glowing terms the deep concern, thoroughness, and wisdom with which these questions were being handled in Washington ... [His] words lifted a great weight from my heart. I was happy to

accept his word and his authority. I did not circulate Szilard's petition [at Los Alamos]. Today I regret that I did not.

Interviewed by Palevsky, Teller, while confirming his feelings of "relief" that he "did not have to take any action on a matter as difficult as deciding how the bomb should be employed", criticized Oppenheimer for a glaring double-standard: offering advice to the military (as a member of the Targeting Committee) while denying input to those who opposed the decision (Palevsky, 2000, pp. 42-44). Pressed on the complex lessons of his experience, Teller then sings Palevsky the old party line: "Look, the scientists, by giving you the tools, are not responsible for the use of these tools" (Teller in Palevsky, 2000, p. 55).

In the wake of the attack on Hiroshima, social critic Dwight MacDonald (1957, pp. 171, 174-175) argued that "perhaps only among men like soldiers and scientists, trained to think 'objectively' – i.e., in terms of means, not ends – could such irresponsibility and moral callousness be found". He continued: the effect on me, at least, was to intensify some growing doubts about the "Scientific Progress" which has whelped this monster. Last April, I noted that in our movies the white coat of the scientist is as blood-chilling a sight as Dracula's black cape ... If the scientist's laboratory has acquired in Popular Culture a ghastly atmosphere, is this not perhaps one of those deep intuitions of the masses? From Frankenstein's laboratory to Maidanek (or, now, to Hanford and Oak Ridge) is not a long journey. Was there a popular suspicion, perhaps only half conscious, that the 19th century trust in science was mistaken..? These questions seem more and more relevant. I doubt if we shall get satisfactory answers from the scientists (who, indeed, seem professionally incapable even of asking, let alone answering, them).

Why is it that the scientists, historians and politicians who praise the "success" of the Manhattan Project are unable to even contemplate such a critique of the notion of *scientific progress*, let alone consider the possibility that a very different science is possible?

Many schools of thought have challenged the prevailing western scientific worldview. The social theorists of the Frankfurt School, indigenous science writers and concerned scientists from within the western tradition could all be marshaled against the reductionist method and its "logical" culmination in the mushroom cloud. Given our specific theme, however – the women of the Manhattan Project and their elevation to feminist role models – we should listen first to the critique of a very different group of feminist scholars.

There can be no doubt that women are as capable of men in succeeding in all fields of contemporary scientific inquiry. And many women (often self-identified feminists) are content to fight for equal access to all those sites – including the innumerable weapons labs, nuclear and otherwise, of the post-Manhattan military-industrial complex. But should this really be the goal? If so, Helen Smith was perhaps correct to sense the irrevocable contamination of *all*

science from the violent application of atomic physics. But might a modern-day Smith take heart from the growing number of scholars intent on puncturing the claims of a purportedly neutral, value-free science and exploring the scope for an authentically “new”, creative and holistic, approach?

Might such a young woman be intrigued, for example, by Carolyn Merchant’s demonstration, in *The Death of Nature* (1980), of the profound linkages between modern science and the exploitation of both nature and women? In charting the transformation of the dominant western view of the cosmos from organism to machine, Merchant calls into question the political, ecological, philosophical and indeed scientific implications “naturally” arising from the reductionist dogma. Merchant’s (1980) inquiry into the reconstruction of nature as “dead and passive, to be dominated and controlled by humans” simultaneously creates space to consider “a new world view that could guide twenty-first-century citizens in an ecologically sustainable way of life”.

With the origins of the mechanistic worldview thus illumined, might our young woman proceed to dig deeper into the cornerstone claim of scientific value-neutrality – and be drawn in the process to the pedagogical conviction of physicist Karen Barad (1995) that, rather than presenting the world of science “as it is”, messages are sent to students “not only by what we say but also by what we don’t bother saying”. Or might they be, likewise, inspired by Vandana Shiva’s (1988) piercing critique of the violent, value-laden quality of reductionist inquiry? Shiva, though herself holding a Ph.D. in physics, stands very much on the margins of mainstream science. What is desperately needed is an increase in the number of scientists – men and women – advocating a basic alteration in the way we view the natural and social world, who challenge the fallacy, and transcend the stunted practice, of a supposedly neutral approach. As Londa Schiebinger (1997, p. 211) has argued, “change for women within the sciences ... is a complex and broadly social process. It is not uniquely women, but women *and* men with a critical awareness of gender, who are the agents of that change”.

Conclusions

In critiquing the approach taken in *Their Day in the Sun*, I have sought to sketch an alternative feminist outline of the Manhattan Project, one respecting the views of those women and men who refused to participate while illuminating the repressive and hierarchal structures requisite for “success”. In addition I have included the voices excised by the official narrative, stressed the multiple negative legacies of the project and pointed to the search for workable, sustainable alternatives to the science and technologies of reductionist violence.

Such a perspective can only be rooted in a critique of the pseudo “objectivity” generating the modern scientific denial of its own social

construction and responsibility. It is *this* category of feminist science that we can learn from, one disavowing the Manhattan Project as anything to be proud of, saluting the example of the men and women who refused to “birth” the monster, and seeking a new, humane science (drawing on non-Western as well as repressed Western traditions) as a vital element in the search for peace and survival in the nuclear age.

Attempts to draw women into the scientific professions by pointing to instances where they participated in major military-industrial endeavours is foolhardy. If we want *everyone* to benefit from science then we need to rethink science itself. As a starting point, we can at least encourage a commitment to the argument that scientific inquiry be grounded in serious reflection on its social implications. Those who celebrate, for whatever broader purpose, scientific “successes” in the development of weapons of mass destruction are not taking even the smallest of steps in this direction. In shining positive light on those women who participated in the Manhattan Project (most of them, in effect, blindfolded), new shadows are cast on those seeking a world in which intellectual inquiry is used to create rather than destroy.

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